Appendix C | Normalizing National Coastal Condition Reports I and II

The National Coastal Condition Report (NCCR I) was completed in 2000 (U.S. EPA, 2001) and covered the period from 1990 to 1996. The NCCR I included seven indicators calculated using probabilistic sampling survey data (e.g., EMAP) and non-probabilistic information. Probabilistic sampling data were available for half of the estuarine resources of the Northeast Coast and all of the estuarine resources of the Southeast Coast and Gulf Coast regions. Non-probabilistic information was used from selected West Coast estuaries and the Great Lakes. The indicators (eutrophication potential, water clarity, dissolved oxygen, wetland loss, sediment contaminants, benthic index, and fish contaminants) covered the major stressors (water quality, sediment quality) and biological responses (benthos and fish) for coastal ecosystems. However, only five of these indicators (water clarity, dissolved oxygen, sediment contaminants, benthic index, and fish contaminants) were based on consistent and comprehensive data covering most U.S. estuarine area. Eutrophication potential was based on a combination of expert opinion and long-term data (Bricker et al., 1999). The wetland loss information came from the National Wetlands Inventory (NWI, 1995) and reflected loss rates for twenty decades (1780 to 1980). Although this report included information for all U.S. estuarine systems, the combination of qualitative and quantitative information made the overall indicator scores for the region and nation more uncertain than the survey data.

The NCCR I was relatively well received, but a number of criticisms were made regarding (1) its use of simple nationwide reference conditions (e.g., water clarity); (2) its use of the 200-year loss period for wetlands, when much of the loss occurred prior to 1990; (3) its use of expert opinion for some of its eutrophication information; (4) its use of three indicators representing water quality out of the total of seven indicators used to assess condition; (5) the lack of information for the upper Northeast Coast (Massachusetts through Maine) and the West Coast; and (6) the use of a simple mean of the seven indicators to characterize overall estuarine condition.

This National Coastal Condition Report (NCCR II) uses probabilistic survey data from 1996 to 2000. It attempts to address many of the criticisms about the first NCCR I, but also creates problems for comparisons between the two reports. NCCR II uses indicators representing the same stressors and responses; however, these indicators are constructed differently. NCCR II only uses five indicators (water quality index, sediment quality index, coastal habitat index, benthic index, and fish tissue contaminants index). The additional indicators, water clarity and dissolved oxygen, were still reported, but rather than contributing directly to the overall rating score reported in NCCR II, they contribute to the water quality index. The primary changes made in the NCCR II to address the earlier criticisms are as follows:

- Probabilistic surveys have been conducted in all estuarine waters of the conterminous 48 states. This means that comprehensive, consistent, probabilistic survey data were available for the waters of Massachusetts through Maine and for West Coast estuaries. These data were not available for the first report. Available non-probabilistic data continue to be used to characterize Great Lakes condition.
- Reference conditions for water clarity are regionalized to reflect expected (natural background) conditions rather than using a standard nationwide reference condition of 10% surface light penetration to a depth of 1 meter. This means that in NCCR II, areas of naturally low water clarity are not automatically characterized as poor.

- Wetland losses are characterized by a combination of long-term losses (1780–1990) and losses for the most recent decade (1990–2000). This means the criteria for poor condition for NCCR II decreased by a factor of 40.
- The water quality indicator is based on an index constructed from survey data on nutrients (nitrogen and phosphorus), water clarity, chlorophyll *a*, and dissolved oxygen. These five subindicators are combined into a single measure of water quality. Nitrogen, phosphorus, water clarity, and chlorophyll *a* use regionalized reference conditions that are adjusted to reflect the summertime sampling period. Dissolved oxygen continues to use a nationwide reference condition. This means that the water quality indicator in NCCR II is based on consistent and comprehensive information collected from 1996 to 2000, instead of more long-term data and expert opinion used in the NCCR I.
- Only one measure of water quality (water quality index) is used to characterize overall condition. This means that water quality only contributes 20% to overall condition in NCCR II. In the previous report, water quality indicators contributed more than 40% to the overall rating.
- Sediment quality is based on a combination of sediment contaminants, sediment toxicity, and sediment TOC. In the NCCR I, only sediment contaminants were used. Poor condition in sediment contaminants in NCCR II is based on exceedance of ERM guidelines, whereas in NCCR I, it is based on exceedance of ERM or more than 5 ERL guidelines.
- Fish tissue contaminants are characterized by whole-body concentrations and are compared to EPA risk-based consumption guidelines in the NCCR II. In the NCCR I, fish contaminants were based on fillet concentrations and compared to FDA criteria.

As a result of these changes, the NCCR I and the NCCR II are not directly comparable. In order to facilitate comparisons between the two reports, the results of NCCR I have been re-evaluated using the analysis approaches used in NCCR II. The results (as reported) in the two reports are listed in Tables C-1 and C-2.

In order to compare the two sets of results, the scores from the NCCR I were altered in the following ways:

- Water clarity, dissolved oxygen, and eutrophication were combined into a single water quality index. If any of the three components is poor, the water quality index is rated as poor. Using this method, water quality was poor in all regions for NCCR I except the Southeast Coast, and no measure is available for the Great Lakes. Recalculating this index did not change the regional or national rating for water quality condition.
- Sediment contaminants were recalculated using only ERM values to determine poor condition and combined with sediment toxicity to create a sediment quality index. This method improved the sediment quality index for all regions except the Northeast Coast and Great Lakes in the NCCR I.
- Fish contaminants were recalculated based on the EPA risk-based guidelines for consumption rather than the FDA limits.
- Overall condition was calculated based on five indicators rather than seven.

Table C-1. Comparison of Percent Area of Poor Condition[a] by Indicator and Region for 2001 vs. 2004 National Coastal Condition Reports (v1 = NCCR I and v2 = NCCR II).

Indicator	Northeast Coast		Southeast Coast		Gulf Coast		West Coast		Great Lakes		Puerto Rico		United States	
	v1	v2	v1	v2	v1	v2	v1	v2	v1	v2	v1	v2	v1	v2
Water Quality Index[b]	60	19	13	5	38	9	20	3	–	–	–	9	40	11
Water Clarity[c]	6	23	12	10	22	23	1	36	–	–	–	20	4	23
Dissolved Oxygen[d]	5	10	2	2	4	1	0	1	–	–	–	1	4	4
Sediment Quality Index[e]	41	16	13	8	43	12	–	14	–	–	–	61	35	13
Coastal Habitat Index[f]	39	1.00	40	1.06	50	1.30	68	1.90	51	–	–	–	48	1.26
Benthic Index	23	22	17	11	23	17	–	13	–	–	–	35	21	17
Fish Tissue Contaminants Index[g]	30	31	9	5	20	14	–	27	–	–	–	–	26	22
Overall Condition[h]	43	40i	46	23	49	40	–	23	–	–	–	77	44	35

[a] Percent area of poor condition is the percentage of total estuarine surface area in the region or the nation (proportional area information is not available for Great Lakes in 2001 or 2004; it is available for selected estuaries in the West Coast in 2001; and in Puerto Rico, it is available only for the 2004 report).

[b] Water quality index is a combination of dissolved oxygen, chlorophyll, nitrogen, phosphorus, and water clarity in 2004 and the NOAA estimate of high potential for eutrophication in 2001.

[c] Water clarity is used as primary indicator with a national reference value in 2001 and is used as a component of eutrophication with regional reference values in 2004.

[d] Dissolved oxygen is used as a primary indicator with a national reference value in 2001 and is used as a component of eutrophication with a national reference value in 2004.

[e] Sediment quality index is a combination of sediment quality measurements (sediment contaminant concentrations, sediment toxicity, and sediment TOC).

[f] Wetland loss in the NCCR I was based on the percentage lost from 1780 to 1980. In the NCCR II, the coastal habitat index is based on the average mean long-term, decadal wetland loss rate (1780–1990) and the present decade's (1990–2000) wetland loss rate.

[g] Fish tissue contaminants are based on analyses of whole fish (not fillets).

[h] Overall percentage is based on the overlap of the five indicators and includes estuarine area for all 48 conterminous states (by region and total) and Puerto Rico.

[i] In Northeast Coast estuaries, at least one of the five indicators is rated poor at sites representing 40% of total estuarine area.

Table C-2. Rating Scores[a] by Indicator and Region Comparing 2001 (as published) vs. 2004 National Coastal Condition Reports (v1 = NCCR I and v2 = NCCR II).

Indicator	Northeast Coast		Southeast Coast		Gulf Coast		West Coast		Great Lakes		Puerto Rico		United States[b]	
	v1	v2	v1	v2	v1	v2	v1	v2	v1	v2	v1	v2	v1	v2
Water Quality Index	1	2	4	4	1	3	1	5	–[c]	3	–	3	1.7	3.2
Water Clarity	5	NI[d]	4	NI	3	NI	5	NI	5	NI	–	NI	4.3	NI
Dissolved Oxygen	4	NI	5	NI	5	NI	5	NI	4	NI	–	NI	4.5	NI
Sediment Quality Index	41	16	13	8	43	12	–	14	–	–	–	61	35	13
Coastal Habitat Index[f]	2	4	2	3	1	1	1	1	1	2	–	–[e]	1.4	1.7
Benthic Index	1	1	2	3	1	2	3	3	1	2	–	1	1.4	2.0
Fish Tissue Contaminants Index	1	1	5	5	1	3	3	1	1	3	–	–	1.9	2.7
Overall Condition	2.1	1.8	3.6	3.8	1.9	2.4	2.7	2.4	2.2	2.2	–	1.7	2.4	2.3

[a] Rating scores are based on a 5-point system, where 1 is poor and 5 is good (information for Puerto Rico is available only for the NCCR II.)

[b] U.S. score is based on an areally weighted mean of regional scores.

[c] No water quality data were available for the Great Lakes for the NCCR I.

[d] NI = Not included in the rating scores for NCCR II.

[e] No coastal habitat or fish tissue contaminant results are available for Puerto Rico.

The overall effect of the recalculation of the NCCR I scores is to reduce (worsen) all of the regional scores, except the Southeast Coast's, as well as the national score. Rather than a finding of fair condition as was reported in NCCR I, the overall U.S. condition, would have been reported as fair to poor (i.e., score reduction from 2.4 to 2.0) (Table C-3). Other overall changes would have changed ratings in the Northeast Coast (from fair to poor) and the West Coast (from fair to fair to poor). After normalizing the scores in this fashion, a comparison of NCCR I and NCCR II is possible. The information represents too short a time period to assess significant trends, but the comparison of conditions in the early 1990s to 2000 shows higher scores in 2000 for the Gulf Coast and shows the Great Lakes advancing from a poor to fair category. The overall condition scores for Northeast Coast and West Coast estuaries in the 1990s were reduced to poor and fair to poor, respectively, to show no categorical change through 2000.

Table C-3. Rating Scores[a] by Indicator and Region Comparing the 2001 and 2004 National Coastal Condition Reports but Calculated with 2004 Methods.

Indicator	Northeast Coast		Southeast Coast		Gulf Coast		West Coast		Great Lakes		Puerto Rico		United States[b]	
	v1[c]	v2[c]	v1	v2	v1	v2	v1	v2	v1	v2	v1[d]	v2	v1	v2
Water Quality Index	1	2	4	4	1	3	1	5	1	3	–	3	1.5	3.2
Sediment Quality Index	2	1	4	4	3	3	2	2	1	1	–	1	2.3	2.1
Coastal Habitat Index[f]	3	4	2	3	1	1	1	1	1	2	–	–[e]	1.6	1.7
Benthic Index	1	1	3	3	1	2	3	3	1	2	–	1	1.5	2.0
Fish Tissue Contaminants Index	2	1	5	5	3	3	3	1	3	3	–	–	3.1	2.7
Overall Condition	1.8	1.8	3.6	3.8	1.8	2.4	2.0	2.4	1.4	2.2	–	1.7	2.0	2.3

[a] Rating scores are based on a 5-point system, where 1 is poor and 5 is good (scores for Puerto Rico are only available for 2004 report).

[b] U.S. score is based on an areally-weighted mean of regional scores.

[c] v1 = NCCR I, v2 = NCCR II

[d] No rating information is available for Puerto Rico in NCCR I.

[e] No coastal habitat index or fish tissue contaminants index results are available for Puerto Rico for NCCR II.